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A LIST OF DEVONIAN FOSSILS  
COLLECTED IN WESTERN  
NEW YORK,  
WITH NOTES ON THEIR STRATI-  
GRAPHIC DISTRIBUTION.

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BY

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The material upon which this paper is based, was collected during the month of September, 1904, and is now a part of the Paleontological collections of this Museum. Especial effort was made while collecting, not only to obtain as complete a fauna as possible at each locality visited, but to have the number of specimens collected of the various species represent, as nearly as might be, their relative abundance at the different localities.

In the Hamilton or Middle Devonian rocks of Western New York and Canada there are three well-defined beds of varying thickness but of constant lithological characters. The upper of these beds is a shale called the Moscow shale; the middle bed is a crystalline limestone varying in thickness from  $1\frac{1}{2}$  to 3 feet, called the Encrinal limestone; and the lowest bed is the Hamilton shale. The Encrinal limestone is present at so many of the outcrops, and is so easily recognized that it serves as a datum line for correlating the shales either above or below it. At none of the localities visited by the writer was there enough of the beds exposed to give any idea of the thickness of the series, but measurements made at other places by other authors show that in a general way the beds may be said to gradually thin out towards the West. Thus at \*Utica, New York, where the measure was obtained from a well, Prosser found a thickness of 1,142 feet.

At the †Livonia salt shaft in Livingston county, about 124 miles west of Utica, Luther reports the thickness of the beds as 517 feet, and at the ‡Crystal salt well near Wyoming, about 23 miles farther west, a thickness of 407 feet. At †Eighteen Mile Creek near Buffalo, about 45 miles west of Wyoming, Shimer and Grabau report that the beds measure only 76 feet. At †Thedford, Ontario, about 130 miles still farther west, a thickness of 81 feet is reported by the same

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\*Am. Geologist, Vol. VI, p. 202.

† 47th N. Y. State Museum Report, p. 258.

‡ Bull. Geol. Soc. of Am., Vol. 13, p. 162.

authors. Thus it appears that, in passing from Utica to Eighteen Mile Creek, a distance of a little less than 200 miles, the beds thin from 1,142 to 76 feet. In the next 130 miles, however, there is comparatively little change in thickness.

The Moscow and Bethany localities have been well known collecting grounds for many years. H. A. Green\* called attention to them as far back as 1866, and still the supply of well preserved fossils is apparently as good as ever.

Moscow: The outcrop at Moscow, from which the Moscow shale received its name, afforded to the writer its characteristic fauna. Fossils were most abundant at the exposures along the creek on the farm of Mr. W. H. DeForrest (Plate LXXIX) about a mile northeast of town. Another exposure was found about a quarter of a mile north of the station where a creek passes under the railway track, and by following the creek up stream, some brachiopods were obtained.

Near East Bethany, six exposures were visited. These are indicated on the map (Plate LXXX) by the field numbers, B<sub>4</sub> to B<sub>9</sub> inclusive.

B<sub>4</sub> is situated about a mile and a half west of the station at the point where the railroad cuts through the top of the divide between the valley of the Genesee River, which empties into Lake Ontario, and that of Tonawanda Creek, which empties into the Niagara River only a short way from Lake Erie. This exposure is about three quarters of a mile in length, and has a depth of, perhaps, 15 feet, where the road crosses it. From this point it tapers down to nothing at each end. This ridge is the highest elevation of land in this locality: Fossil corals and brachiopods are especially abundant here, but many of the other classes of invertebrates are also found. *Hypsocrinus fieldi*, described† by Frank Springer, and the author, came from this locality. The Encrinal limestone appears at the top of the exposure, so that the shale from which the fossils were obtained is the upper part of the Hamilton shale.

B<sub>5</sub> is situated about a mile southeast from the station at the Peck & Wood tile factory. Here the shale is weathered so that it can be plowed. A layer about a foot thick at the top, is very rich in brachiopods. *Neucleospira concinna* is found here, with the hair-like spines preserved. *Tropidoleptus carinatus* is very abundant and attains

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\* Am. Jour. Sci., 2nd Ser., Vol. 41, pp. 121-23.

† Field Col. Mus. Pub., Geol. Series, Vol. II, pp. 267-271.

a much larger size than at Moscow, or at any of the other outcrops at Bethany, with the possible exception of B9. Many of the shells of this species have parasites attached to them. Among these parasites occur three species of bryozoans, worm tubes, and an inarticulate brachiopod. Below this layer rich in brachiopods, the shale is comparatively free from fossils. A few specimens of *Pleurodictyum stylopora* were the only fossils obtained here by the writer.

B6 is situated on the roadside between the tile factory and the station. It is an outcrop of a hard, black shale, lying quite a little higher than either B5, B7, or B9, but whether it is above the Encrinal limestone, the writer was unable to determine. This outcrop was quite small and comparatively unimportant.

B7 marks a number of exposures along the banks of White Creek, a short distance southeast of East Bethany. This locality afforded corals, brachiopods, etc. Monroe\* reports finding *Goniatites* in pyrite nodules at this place, but none was secured by the writer.

B8 is located a mile and a half west of B4, at the point where a small tributary of Tonawanda Creek runs near the track. Along the banks of the tributary are piles of weathered shale in which quantities of bryozoans, corals, and gastropods were found. Just west of here where the road crosses the track, a cut affords a good exposure of a black laminated shale similar to certain upper layers at Moscow, which is practically barren of fossils, but on top of this, is a thin layer in which some large brachiopods were found. The shale near the brook does not appear to be *in situ*, and probably was brought there at the time the railroad was built, from a small cut just east of its present position, where a similar shale is found. The Encrinal limestone is exposed in the bed of this brook, with a moderate dip towards the west. This would determine both the black and the fossiliferous shales to belong to the upper group, or Moscow shale. While these beds are much lower topographically than those at B4, they are undoubtedly higher geologically.

B9 is found by following White Creek up stream from near the tile factory, to several exposures where brachiopods abound. As might be expected from the proximity of their location, the fossils found at these outcrops are similar to those of B5. These outcrops appear to be the upper portions of the beds whose base is exposed in the clay pit at B5.

WINDOM is situated about 8 miles southeast of the business center

\* Bull. Wis. Nat. Hist. Soc., Vol. 2, p. 57.

of Buffalo. Near the railway bridge the Encrinal limestone is exposed with both the Moscow and Hamilton shales. All may also be seen along the banks of the South Branch of Smokes Creek. Between the railroad and the creek, large piles of weathered shale and blocks of limestone are to be found in which fossils are abundant. Brachiopods and corals are the predominating fossils, and a fine series of well preserved specimens was collected, but as most of them came from the dump piles or talus, they are of little value in determining the distribution of the species in the three horizons.

After the identification of this material, the various species were tabulated to see if the geological position of B<sub>5</sub>, B<sub>6</sub>, B<sub>7</sub>, and B<sub>9</sub> in relation to the Encrinal limestone could be determined. Upon comparison of these faunas with those of Moscow, B<sub>4</sub>, and B<sub>8</sub>, it was not only found impossible to determine the position of the unknown faunas, but also it was found that the Moscow fauna did not bear the relation to those of B<sub>4</sub> and B<sub>8</sub>, that might be expected. In order to make the range of localities and faunas studied as complete as possible, published lists of Hamilton fossils by various authors from other localities were referred to and mention of any of the species collected by the present writer noted. It was then found by a study of the table, that while at different localities, the faunas could readily be separated into "upper" and "lower," on correlating the localities, these distinctions could not be maintained. Thus *Aulopora serpens* occurs at Bethany in both the Moscow and Hamilton beds, while at Thedford it is only reported from the Moscow, at Eighteen Mile Creek only from the Hamilton, and at Cayuga Lake, from both. The two species of *Craspedophyllum* are not reported below the Encrinal limestone at either of the other localities, but at Bethany *C. archiaci* is very abundant all through the series, and *C. subcæspitosum* is found only in the Hamilton. *Favosites argus* is reported only from the Moscow at Cayuga Lake, and only from the Hamilton at Eighteen Mile Creek, but at Bethany it is found in both layers. *Strepelasma rectum* is reported as extending through the series, and is so found at Bethany, but the allied species *S. ungula* has been reported only from the Moscow. At Bethany, however, it is found in both the Moscow and Hamilton. The same may be said of *Rhipidomella vanuxemi* and *R. penelope*. They are both found through the series at Bethany, but while the former is so reported, the latter is reported only from the Moscow. *Stropheodonta concava* is reported only from above the Encrinal limestone at Thedford and Cayuga Lake, and

only in and below the Encrinal limestone at Eighteen Mile Creek, but at Bethany it occurs both above and below. *Stropheodonta demissa* is found throughout the series at Bethany, and also at Thedford, but at Eighteen Mile Creek it is reported in the Encrinal bed and below, and at Cayuga Lake only in the Hamilton. *Tropidoleptus carinatus* is found through the series at both Bethany and Cayuga Lake, but at Eighteen Mile Creek in the Encrinal limestone and below, and at Thedford only in the Hamilton.

It is of interest to note that in the Bethany fauna the range of some species, e. g. *Aulopora serpens* and *Tropidoleptus carinatus* corresponds to the Cayuga Lake fauna; that of others, e. g. *Stropheodonta demissa*, corresponds to the Thedford fauna, and *Stropheodonta concava* and *Favosites argus* have as great a range at Bethany as at all the other localities combined. Hence it is not safe to determine the position of isolated beds, in regard to the Encrinal limestone, by the composition of the fauna. A similar conclusion was reached by Cleland\* in his study of the Hamilton beds at Cayuga Lake.

The following table represents the amount of material collected by the writer, with the exception of the bryozoans from "B8." Of these a large series, both of species and specimens, was secured, but as they have not yet been identified, they are not included. The figures against each species in the table indicate the number of specimens collected by the writer. The letters indicate that the same species have been reported by other authors from Thedford, Eighteen Mile Creek, or Cayuga Lake, and the particular letter indicates the bed in which they were found. Thus M, indicates Moscow shale; E, Encrinal limestone, and H, Hamilton shale. The papers consulted for mention of these species are the following: Hamilton Group of Thedford, Ontario, by H. W. Shimer and A. W. Grabau, Bull. Geol. Soc. Am. Vol. 13, p. 149, 1901; Geology and Paleontology of Eighteen Mile Creek and the Lake Shore Sections of Erie County, by A. W. Grabau, Bull. Buffalo Soc. Nat. Sci. Vol. VI, 1899; A Study of the Fauna of the Hamilton Formation of the Cayuga Lake Section in Central New York, by H. F. Cleland, Bull. 206, U. S. Geological Survey, 1903.

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\* Bull. 206, U. S. G. S., p. 91.

# DISTRIBUTION OF SPECIES.

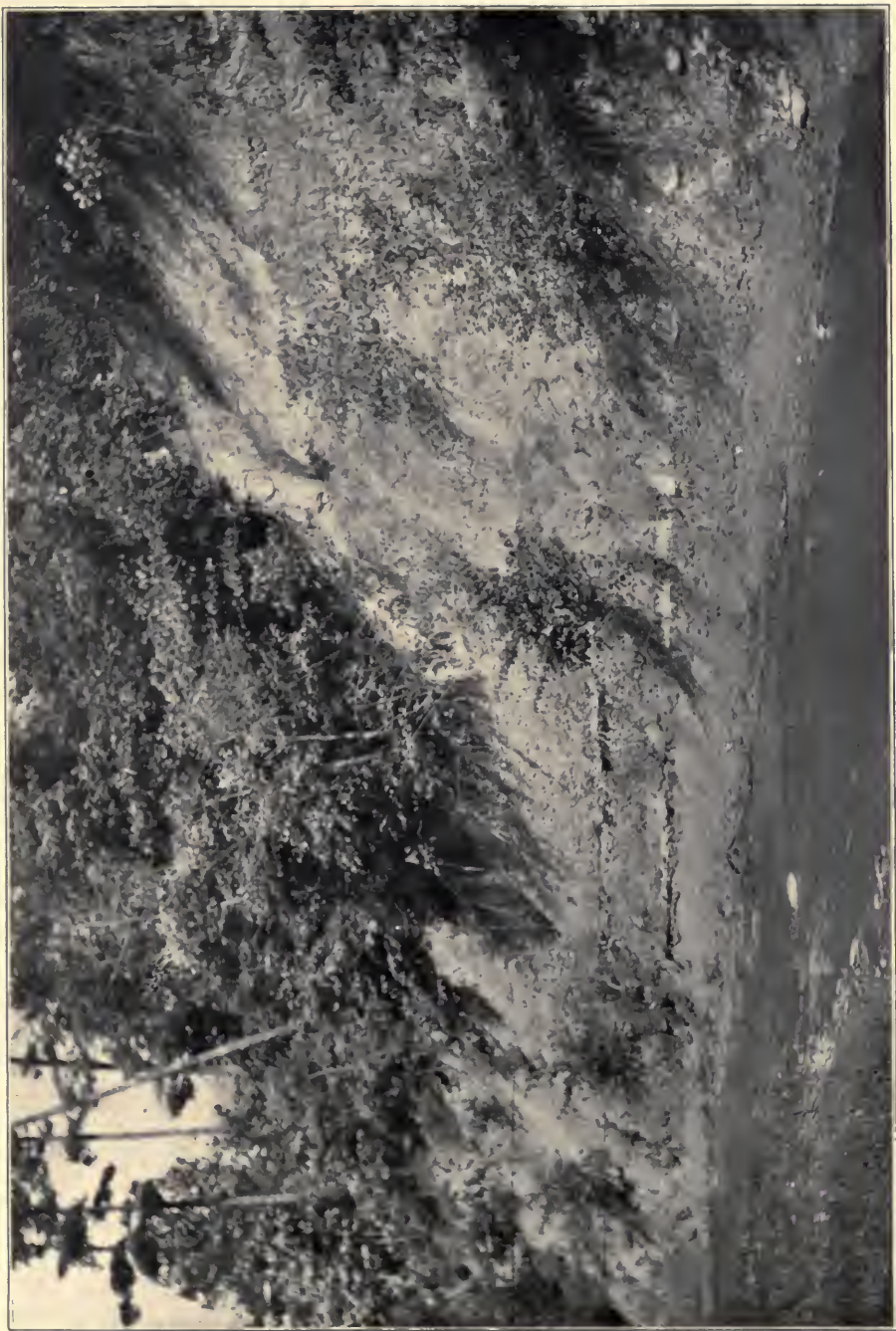
|                                                                 | Moscow. | B 4. | B 5. | B 6. | B 7. | B 8. | B 9. | Windom. | Thetford. | Eighteen<br>Mile Creek. | Cayuga<br>Lake. |
|-----------------------------------------------------------------|---------|------|------|------|------|------|------|---------|-----------|-------------------------|-----------------|
| <b>PORIFERA.</b>                                                |         |      |      |      |      |      |      |         |           |                         |                 |
| <i>Astræospongia hamiltonensis</i><br>M. & W.                   |         | I    |      |      |      |      |      |         | M         |                         |                 |
| <b>CŒLEENTERATA.</b>                                            |         |      |      |      |      |      |      |         |           |                         |                 |
| <i>Alveolites goldfussi Billings</i> . . . . .                  | 4       |      |      |      |      | 14   |      |         | M         |                         |                 |
| <i>Amplexus intermittens Hall</i> . . . . .                     | 53      | 10   |      |      |      |      |      | 68      |           | M                       |                 |
| <i>A. hamiltoniae Hall</i> . . . . .                            | 51      |      |      |      |      | 18   | 4    | 57      |           | M                       |                 |
| <i>A. yandelli E. &amp; H.</i> . . . . .                        |         | I    |      |      |      |      |      |         |           |                         |                 |
| <i>Aulopora serpens Goldf.</i> . . . . .                        |         | II   | 2    |      |      | 8    |      | 2       | M         | H                       | M-H             |
| <i>A. tubæformis Goldf.</i> . . . . .                           |         | I    |      |      |      | 2    |      |         |           | H                       |                 |
| <i>A. erecta Rominger.</i> . . . . .                            |         | 4    |      |      |      | 6    |      |         |           |                         |                 |
| <i>A. sp.</i> . . . . .                                         |         | 10   |      |      |      | 6    |      |         |           |                         |                 |
| <i>Blothrophyllum conatum Hall</i> . . . . .                    |         | 36   |      |      | 3    | 24   |      |         | M         | M                       |                 |
| <i>Ceratopora jacksoni Grabau</i> . . . . .                     |         | 17   |      |      |      | 31   |      | 12      |           | H                       |                 |
| <i>Craspedophyllum archiaci Billings</i> . . . . .              | 12      | 163  |      |      | 4    | 141  | 2    |         | E         | E                       | M               |
| <i>C. subcæspitosum Nich.</i> . . . . .                         |         | 64   |      |      |      |      |      |         | M         | E                       |                 |
| <i>C. sp.</i> . . . . .                                         |         | 38   |      |      |      | 61   |      |         |           |                         |                 |
| <i>Cyathophyllum gradatum Hall</i> . . . . .                    |         | 11   |      |      |      | 7    |      |         |           |                         |                 |
| <i>C. nanum Hall</i> . . . . .                                  |         | 6    |      |      |      | 49   |      |         |           |                         |                 |
| <i>C. nepos Hall</i> . . . . .                                  |         | 4    |      |      | I    | 5    |      |         |           |                         |                 |
| <i>C. palum Hall</i> . . . . .                                  |         | 5    |      |      |      | 6    |      |         |           |                         |                 |
| <i>C. perlamelosum Hall</i> . . . . .                           |         | 3    |      |      | I    |      |      |         |           |                         |                 |
| <i>C. robustum Hall</i> . . . . .                               |         | 22   |      |      |      | 3    |      |         | M         |                         |                 |
| <i>C. sp.</i> . . . . .                                         | 4       |      |      |      |      |      |      |         |           |                         |                 |
| <i>Cystiphyllum americanum E &amp; H</i> . . . . .              | 16      |      |      |      |      | I    |      |         |           | M                       |                 |
| <i>C. conifolle Hall</i> . . . . .                              | 48      | 24   |      |      |      | 4    |      |         | M         | M-H                     |                 |
| <i>C. corrugatum Hall</i> . . . . .                             |         | 3    |      |      | 2    |      |      |         |           |                         |                 |
| <i>C. varians Hall</i> . . . . .                                | 63      | 6    |      |      | 2    | 3    |      |         |           |                         |                 |
| <i>Favosites arbuscula Hall</i> . . . . .                       | 22      | 44   |      |      | 10   | 70   |      |         |           |                         |                 |
| <i>F. argus Hall</i> . . . . .                                  |         | 4    |      |      | 7    | 13   |      |         |           | H                       | M               |
| <i>F. billingsi Rominger</i> . . . . .                          |         | 15   |      |      | I    | I    |      |         | M         | E                       |                 |
| <i>F. clausus Rominger</i> . . . . .                            | 23      | 136  |      |      | 4    | 32   |      |         | M         |                         |                 |
| <i>F. emmonsi Rominger</i> . . . . .                            | 3       | 3    |      |      | 2    | 12   | 2    |         |           |                         |                 |
| <i>F. hamiltoniæ Hall</i> . . . . .                             |         |      |      |      |      |      |      | 3       |           |                         |                 |
| <i>F. hemisphericus turbinatus</i><br><i>Billings</i> . . . . . |         | 19   |      |      |      | 4    |      |         | EM        |                         |                 |
| <i>F. nitella Rominger</i> . . . . .                            | 13      | 65   |      |      |      | 7    | I    |         |           |                         |                 |
| <i>F. placenta Rominger</i> . . . . .                           |         | 93   |      |      | 4    | 113  |      |         | M         |                         |                 |
| <i>F. tuberosa Rominger</i> . . . . .                           |         | 4    |      |      |      | 2    | I    |         |           |                         |                 |
| <i>Heliophyllum arachne Hall</i> . . . . .                      | 2       |      |      |      |      |      |      |         |           |                         |                 |
| <i>H. confluens Hall</i> . . . . .                              |         |      |      |      |      |      | I    |         |           |                         |                 |
| <i>H. dejener Hall</i> . . . . .                                |         | 5    |      |      | I    | 2    |      |         |           |                         |                 |
| <i>H. halli E. &amp; H</i> . . . . .                            | 13      | 122  |      |      | 8    | 24   | 2    |         | M         | M-H                     | M-H             |
| <i>H. irregulare Hall</i> . . . . .                             |         | 21   |      |      |      | 22   |      |         |           |                         |                 |
| <i>H. juvene Rominger</i> . . . . .                             | I       | 48   |      |      | 5    | 44   |      |         |           |                         |                 |
| <i>H. reflexum Hall</i> . . . . .                               |         | 26   |      |      |      | 4    |      |         |           |                         |                 |
| <i>Hadrophyllum woodi Grabau</i> . . . . .                      | 5       |      |      |      |      |      | I    | 19      |           |                         |                 |

|                                        | Moscow. | B 4. | B 5. | B 6. | B 7. | B 8. | B 9. | Windom. | Thedford. | Eighteen<br>Mile Creek. | Cayuga<br>Lake. |
|----------------------------------------|---------|------|------|------|------|------|------|---------|-----------|-------------------------|-----------------|
| CŒLEENTERATA—Con.                      |         |      |      |      |      |      |      |         |           |                         |                 |
| Lichenalia sp. ....                    | 1       |      |      |      |      |      |      |         |           |                         |                 |
| Michelinia insignis Rominger . . . . . |         | 6    |      |      | 1    | 23   |      |         | M         |                         |                 |
| Monilopora antiqua Whitfield . . . . . |         | 2    |      |      |      |      |      |         |           |                         |                 |
| Pleurodictyum dividua Hall . . . . .   |         | 2    |      |      |      | 12   |      |         |           |                         |                 |
| P. stylopore Eaton . . . . .           | 3       |      | 5    |      | 7    | 9    | 9    | 5       |           | H                       | M-H             |
| Streptelasma rectum Hall . . . . .     | 28      | 11   |      |      | 6    | 4    | 3    | 30      |           | M-H                     | M-H             |
| S. ungula Hall . . . . .               | 60      | 18   |      | 1    | 18   | 10   |      | 21      |           | M                       |                 |
| Stromatopora sp. . . . .               |         | 8    |      |      |      | 9    |      |         |           |                         |                 |
| Syringopora sp. . . . .                |         |      |      |      |      | 2    |      |         |           |                         |                 |
| Trachypora limbata Eaton . . . . .     | 3       |      |      | 2    | 5    | 77   | 1    |         |           |                         |                 |
| Zaphrentis exigua Billings . . . . .   |         | 16   |      |      |      | 5    |      |         |           |                         |                 |
| Z. simplex Hall . . . . .              | 14      | 30   |      |      |      | 10   |      |         |           | ME                      | M               |
| Z. sp. . . . .                         |         |      |      |      |      | 2    |      |         |           |                         |                 |
| PELMATOZOA.                            |         |      |      |      |      |      |      |         |           |                         |                 |
| Hypsocrinus fieldi Spr. & Sl. . . . .  |         | 1    |      |      |      |      |      |         |           |                         |                 |
| Ancyrocrinus bulbosus Hall . . . . .   |         |      |      |      | 1    | 2    |      | 1       | H         | M-H                     | E               |
| Codaster hindei E. & C. . . . .        |         | 1    |      |      |      |      |      |         |           |                         |                 |
| Pentremitidea sp. . . . .              |         |      |      |      |      | 1    | 1    |         |           |                         |                 |
| Crinoid plates . . . . .               |         | 1    |      |      |      | 5    |      |         |           |                         |                 |
| Crinoid roots . . . . .                | 2       | 1    | 9    | 1    |      | 10   |      |         |           |                         |                 |
| Crinoid stems . . . . .                | 10      |      | 16   |      |      | 6    | 14   | 5       |           |                         |                 |
| Crinoid arms . . . . .                 |         |      |      |      |      | 1    |      |         |           |                         |                 |
| VERMES.                                |         |      |      |      |      |      |      |         |           |                         |                 |
| Autodetus lindstromi Clark. . . . .    |         |      |      |      |      | 1    |      |         |           |                         |                 |
| Cornulites hamiltoniæ Grabau . . . . . |         |      |      |      |      | 5    | 3    |         |           |                         |                 |
| Spirorbis angulatus Hall . . . . .     |         |      | 26   |      |      | 5    | 10   |         |           | H                       | H               |
| S. omphaloides Nichols . . . . .       | 1       |      |      |      |      |      |      |         | M         |                         |                 |
| Worm teeth . . . . .                   |         |      |      |      |      | 2    |      |         |           |                         |                 |
| Fish bone . . . . .                    |         |      |      |      |      |      |      | 1       |           |                         |                 |
| BRYOZOA.                               |         |      |      |      |      |      |      |         |           |                         |                 |
| Botryllopora socialis Nich . . . . .   |         |      |      |      |      |      | 3    |         | M         | H                       |                 |
| Hederella canadensis Nich . . . . .    |         | 4    | 40   |      |      | 6    |      | 1       | M         | H                       | M               |
| H. cirrhosa Hall . . . . .             | 4       | 2    | 14   |      | 1    | 14   | 18   |         |           |                         |                 |
| H. filliformis Billings . . . . .      |         |      | 7    |      |      |      |      |         | M         | M                       |                 |
| Monotrypa fruticosa Hall . . . . .     | 40      |      |      |      |      |      |      |         |           | H                       | M-H             |
| M. furcata Hall . . . . .              | 30      |      |      |      |      |      |      |         |           | M-H                     |                 |
| Stictopora incisurata Hall . . . . .   | 1       |      | 14   |      |      |      |      |         |           | EH                      | M               |
| BRACHIOPODA.                           |         |      |      |      |      |      |      |         |           |                         |                 |
| Ambocoëlia umbonata Conrad . . . . .   | 22      |      |      |      |      | 7    | 97   | 19      | M         | M-H                     | M-H             |
| A. nana Grabau . . . . .               |         | 10   |      |      |      | 13   |      |         |           | H                       |                 |
| Athyris spiriferoides Eaton . . . . .  | 28      | 50   |      | 2    | 22   | 90   | 13   | 106     | M         | M-H                     | M-H             |
| A. fultonensis Swallow . . . . .       |         | 2    |      |      |      |      |      |         | H         |                         |                 |
| Atrypa reticularis Linn . . . . .      | 30      | 103  | 1    |      |      | 72   | 15   | 14      | M         | M-H                     | M-H             |
| A. spinosa Hall . . . . .              | 16      |      |      |      |      |      |      | 3       |           | M                       |                 |
| Camarotoëchia billingsi Hall . . . . . |         | 6    |      |      |      | 14   |      |         |           |                         |                 |
| C. horsfordi Hall . . . . .            | 21      | 8    | 12   |      |      | 11   | 18   | 1       |           | M-H                     | ME              |
| C. sappho Hall . . . . .               |         |      |      |      |      | 10   |      |         | M         | EH                      | M-H             |
| C. tethys Billings . . . . .           |         |      |      |      |      | 17   |      |         |           |                         |                 |
| Chonetes coronatus Conrad . . . . .    | 3       | 11   | 7    |      |      | 27   | 60   | 1       |           | EH                      | M-H             |
| C. lepidus Hall . . . . .              |         | 1    |      |      |      |      |      |         | M         | M-H                     | M-H             |
| C. mucronatus Hall . . . . .           | 4       | 9    |      |      | 11   | 13   | 28   | 12      |           | M-H                     | M-H             |
| C. scitulus Hall . . . . .             |         |      |      |      | 58   | 3    | 24   | 3       | M-H       | M-H                     | M-H             |
| C. vicinus Castelnau . . . . .         | 2       |      | 7    |      |      |      |      |         | M-H       | M-H                     | M               |
| Cranæna romingeri Hall . . . . .       |         |      |      |      |      | 16   |      |         | M         | H                       |                 |

|                                              | Moscow. | B 4. | B 5. | B 6. | B 7. | B 8. | B 9. | Windom. | Thedford | Eighteen<br>Mile Creek. | Cayuga<br>Lake. |
|----------------------------------------------|---------|------|------|------|------|------|------|---------|----------|-------------------------|-----------------|
| BRACHIOPODA—Con.                             |         |      |      |      |      |      |      |         |          |                         |                 |
| <i>Crania crenistriata Hall</i> .....        |         | 4    |      |      |      | 1    |      |         | M        | H                       |                 |
| <i>Craniella hamiltonia Hall</i> .....       |         | 3    | 1    |      |      | 5    | 2    | 5       | M        | M-H                     | M-H             |
| <i>Cryptonella planirostris Hall</i> ....    |         | 6    |      |      |      | 21   | 2    |         |          | EH                      | H               |
| <i>C. rectirostris Hall</i> .....            | 4       | 8    |      |      |      | 21   |      |         |          | H                       | H               |
| <i>Cyclorhina nobilis Hall</i> .....         |         | 1    |      |      |      | 1    |      |         | M        |                         |                 |
| <i>Cyrtina hamiltonensis Hall</i> .....      | 3       | 52   |      |      |      | 76   | 7    |         | M-H      | M-H                     | M-H             |
| <i>C. hamiltonensis recta Hall</i> .....     |         | 8    |      |      |      | 5    |      |         | M        | H                       |                 |
| <i>Delthyris consobrina d'Orb</i> .....      | 13      |      |      |      |      | 2    |      | 13      | M        | M                       | M-H             |
| <i>D. sculptilis Hall</i> .....              | 2       | 13   |      |      |      | 71   |      | 2       | E        | E                       | H               |
| <i>Eunella lincklaeni Hall</i> .....         |         |      |      |      |      | 9    |      |         |          |                         | M-H             |
| <i>Leiorhynchus dubium Hall</i> .....        |         |      |      |      |      | 2    |      |         |          | H                       | E               |
| <i>L. laura Billings</i> .....               | 1       | 6    |      |      |      | 20   |      |         | M        | M-H                     | M-H             |
| <i>Lingula</i> sp. ....                      | 3       |      |      | 2    |      | 1    |      |         |          |                         |                 |
| <i>Meristella barrisi Hall</i> .....         |         | 6    |      |      | 1    |      |      |         |          |                         |                 |
| <i>M. haskinsi Hall</i> .....                | 1       |      |      |      |      | 4    |      |         |          | E                       | EH              |
| <i>Nucleospira concinna Hall</i> .....       | 2       | 40   | 76   | 17   |      | 101  | 13   | 3       | M        | M-H                     | M-H             |
| <i>Orthothes arctostriatus Hall</i> ...      |         | 2    |      |      |      |      |      |         | M-H      | M-H                     | M-H             |
| <i>O. chemungensis Conrad</i> .....          |         |      |      |      |      | 2    | 2    |         |          | M-H                     | M-H             |
| <i>Parazyga hirsuta Hall</i> .....           | 30      |      |      |      | 1    | 121  |      |         | M        |                         |                 |
| <i>Pholidostrophia iowaensis Owen</i> ..     | 93      |      |      |      |      | 48   | 1    |         | M-H      | EH                      | M-H             |
| <i>Productella spinulicosta Hall</i> ...     | 5       |      |      |      |      |      |      |         |          |                         | M-H             |
| <i>Reticularia fimbriata Conrad</i> ....     |         | 9    |      |      |      | 17   | 3    |         |          |                         | M-H             |
| <i>Rhipidomella leucosia Hall</i> .....      |         |      |      |      |      | 32   |      |         |          |                         |                 |
| <i>R. penelope Hall</i> .....                |         | 56   |      |      |      | 44   | 11   | 5       |          |                         | M               |
| <i>R. vanuxemi Hall</i> .....                | 46      | 147  | 2    |      |      | 220  | 24   | 32      |          |                         | M-H             |
| <i>Romerella grandis Vanuxem</i> .....       | 1       |      |      |      |      |      |      |         |          |                         |                 |
| <i>Spirifer acuminatus Conrad</i> .....      |         |      |      |      |      |      |      | 1       |          |                         |                 |
| <i>S. angustus Hall</i> .....                |         | 3    |      |      |      |      | 2    |         |          |                         |                 |
| <i>S. audaculus Conrad</i> .....             | 47      |      |      | 8    |      |      | 6    | 46      | E        | M-H                     | M-H             |
| <i>S. audaculus macronotus Hall</i> ....     | 2       | 20   | 1    |      |      | 45   |      | 6       |          |                         | M-H             |
| <i>S. divaricatus Hall</i> .....             |         | 1    |      |      | 1    | 7    |      |         | E        |                         | EH              |
| <i>S. granulosus Conrad</i> .....            | 4       | 4    |      |      |      | 3    | 3    | 12      |          | EH                      | M-H             |
| <i>S. granulosus clintoni Hall</i> .....     |         |      |      |      |      | 3    | 3    |         |          |                         | M               |
| <i>S. marcyi Hall</i> .....                  | 3       |      |      |      |      | 6    | 1    |         |          |                         | M               |
| <i>S. pennatus Atwater</i> .....             | 10      | 7    | 22   | 6    | 26   | 55   | 29   | 76      | M-H      | M-H                     | M-H             |
| <i>Stropheodonta concava Hall</i> .....      | 7       | 3    |      |      | 4    | 5    |      | 2       | M        | EH                      | M               |
| <i>S. demissa Conrad</i> .....               |         | 51   |      |      |      | 37   |      | 20      | M-H      | EH                      | H               |
| <i>S. inæquistriata Conrad</i> .....         | 7       | 24   |      |      | 1    | 128  | 5    | 4       | M        | M-H                     | M-H             |
| <i>S. perplana Conrad</i> .....              | 1       | 6    |      |      |      | 2    |      | 5       | M        | M-H                     | M-H             |
| <i>S. plicata Hall</i> .....                 |         |      |      |      |      | 5    |      |         |          | H                       |                 |
| <i>S. textilis Hall</i> .....                | 1       |      |      |      |      |      | 1    |         |          |                         |                 |
| <i>S. sp.</i> .....                          |         |      |      |      |      | 9    | 3    |         |          |                         |                 |
| <i>Terebratula</i> sp. ....                  |         | 9    |      |      |      |      |      |         |          |                         |                 |
| <i>Tropidoleptus carinatus Conrad</i> ...    | 23      | 6    | 106  |      |      | 6    | 68   | 29      | E        | HE                      | M-H             |
| PELECYPODA                                   |         |      |      |      |      |      |      |         |          |                         |                 |
| <i>Actinopteria boydi Conrad</i> .....       | 4       |      |      | 1    |      | 1    |      |         | H        | H                       | M-H             |
| <i>A. decussata Hall</i> .....               |         | 2    |      |      |      |      |      |         |          |                         | ME              |
| <i>Aviculopecten princeps Conrad</i> ...     | 2       |      |      |      |      |      |      |         | M        | EH                      | M-H             |
| <i>Conocardium eboraceum Hall</i> ....       |         |      |      |      |      |      |      | 1       |          |                         |                 |
| <i>Cypriocardella bellistriata Conrad</i> .. |         | 1    |      |      |      |      |      |         |          | EH                      | M-H             |
| <i>Elymella nuculoides Hall</i> .....        |         |      |      |      |      | 1    |      |         |          |                         | M               |
| <i>Goniophora hamiltonensis Hall</i> ...     |         |      |      |      |      |      | 1    |         |          |                         | M-H             |
| <i>Grammysia arcuata Conrad</i> .....        | 3       |      |      |      |      |      |      |         |          | H                       | M-H             |
| <i>Leiopteria Conradi Hall</i> .....         | 3       |      |      |      |      |      |      |         |          |                         | M-H             |
| <i>Modiomorpha concentrica Conrad</i> ...    |         |      | 1    |      |      |      |      |         |          | H                       | M-H             |







Typical outcrop of the Moscow Shale, Moscow, Livingston County, New York.





Map of a portion of the town of Bethany, New York, showing collecting grounds.













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